

**REMARKS**

The Amendment, filed in response to the Office Action mailed September 15, 2009, is believed to fully address all issues raised in the Action. A favorable reconsideration on the merits and allowance of the application is respectfully requested.

***Claims Disposition***

Upon entry of the current amendment, which is respectfully requested, claims 1, 4-6, 13-16, 19-21, and 29-37 are all the claims pending in the application. Claims 2-3, 7-12, 17-18, and 23-28 were previously canceled without prejudice or disclaimer.

Claims 1 and 35 are amended herein by clarifying that the titanium dioxide is “Fe(III)” doped titanium dioxide “0.5”-2.0 wt.% and by removing the phrase “titanium dioxide being doped with one or more selected from a group consisting of vanadium (V), molybdenum (Mo) and niobium (Nb).” The limitation “Fe(III) doped titanium dioxide” is supported by, for example, original claims 8 and 9. Claims 1 and 35 are further amended to more clearly set forth the claimed subject matter by incorporating the element “potassium sorbate of more than 0.1 to less than 0.5 wt%.” Support for these amendments can be found, for example, in Examples 5-8 and Table 4 of the present specification.

Claims 16 and 32 are amended herein by removing the “sodium propionate of 0.01-1 wt.%” feature and including the “potassium sorbate of more than 0.1 to less than 0.5 wt%” feature to more clearly set forth the claimed subject matter. Support for these amendments can be found, for example, in Examples 1-16. Claim 16 has further been amended by clarifying that the anatase content is 70% or more of “0.5”-2.0 wt.%, as is recited in claim 32, for example.

Claims 33 and 37 are amended herein by clarifying that the titanium dioxide is “Fe(III)” doped titanium dioxide “0.5”-2.0 wt.% and incorporating the element “potassium sorbate of

more than 0.1 to less than 0.5 wt%.” Support for these amendments can be found, for example, in Examples 5-8 and Table 4 of the present specification.

No new matter is introduced.

***Formal Matters***

Applicants thank the Examiner for entering Applicants’ submission of July 1, 2009 and for withdrawing the finality of the Office Action pursuant to 37 C.F.R. § 1.114.

***Response to Provisional Obviousness-type Double Patenting Rejection***

In the Office Action, claims 1, 2, 4-6, 8, and 13-16 are provisionally rejected on the ground of nonstatutory obviousness type double patenting as being unpatentable over claims 1-4, 6, and 11-14 of copending Application No. 11/579,619 in view of Bastioli et al. (US 5,512,378).

Applicants respectfully request the rejection be withdrawn, as the instant application has an earlier filing date than the copending Application No. 11/579,619 (November 6, 2006) and the instant application is believed to be in the condition for allowability otherwise.

At least, Applicants respectfully request the rejection be held abeyance until the patentable subject matter is determined.

***Response to Rejection under 35 U.S.C. § 112***

In the Office Action, claims 1, 4-6, 13-16, 19-21, and 29-37 are rejected as being indefinite for allegedly failing to comply with the written description requirement. Specifically, the Examiner rejects the aforementioned claims for allegedly not having support for the phrase “based on the total amount of the composition.”

Applicants respectfully traverse.

Claims 1, 16, and 32-37 each recite “a composition” at line 2. Therefore, the phrase “based on the total amount of *the composition*” has proper an antecedent basis.

Also, according to the Examples 1 to 16 and Comparative Examples 17 to 28 of the present specification, the content of each constituent (e.g. unmodified starch, pulp fiber powder, photo catalyst and preservative etc.) added to a composition for a biodegradable starch bowl is based on the total amount of the composition described as 100 wt%. Further, when referring to Tables 3 to 9 of the present specification, it is clear that the amount of each constituent is based on the total amount of the composition, which is described as 100 wt%. Therefore, the phrase "based on the total amount of the composition" in claims is supported by the specification.

Accordingly, Applicants respectfully request the Examiner to withdraw the written description rejection of claims 1, 4-6, 13-16, 19-21, and 29-37.

***Response to Rejections under 35 U.S.C. § 103(a)***

In the Action, claims 4-6, 14-15, 30-32, 34 and 36 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bastioli et al.(US 5,512,378) in view of George et al. (US 5,393,804), Sanbayashi et al. (US 2002/0160910), Sullivan (US 5,382,440), Matsuda et al. (6,183,596), and Kuroda et al. (US 5,786,406).

Claims 33, 35, and 37 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bastioli et al.(US 5,512,378) in view of George et al. (US 5,393,804), Sanbayashi et al. (US 2002/0160910), Sullivan (US 5,382,440), Matsuda et al. (6,183,596), Kuroda et al. (US 5,786,406), and Cassar et al. (US 6,117,229).

Claims 1 and 16 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bastioli et al.(US 5,512,378) in view of George et al. (US 5,393,804), Sanbayashi et al. (US 2002/0160910), Cassar et al. (US 6,117,229), Sullivan (US 5,382,440), Matsuda et al. (6,183,596), Kuroda et al. (US 5,786,406), and Andersen et al. (US 6,030,673).

Claims 13 and 29 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bastioli et al.(US 5,512,378) in view of George et al. (US 5,393,804), Sanbayashi et al. (US 2002/0160910), Matsuda et al. (6,183,596), Sullivan (US 5,382,440), and further in view of Shogren et al. (US 6,146,573).

At pages 5-13 of the Action, the Office provides detailed analysis and discussion of the above references, which are not repeated herein.

Applicants respectfully traverse.

The references cited by the Office, either alone or in combinations, do not teach all and every elements of the currently amended claims, as will be discussed below. Furthermore, the claimed subject matter has unexpected superior effects, as shown in the data in the specification and concurrently submitted Declaration under 37 C.F.R. § 1.132.

The biodegradable starch bowl of present claims 1, 32, 33 and 34 can have advantages in molding property, strength of the bowl, stench, color change, sterilizing and deodorizing effects, and preservative properties by comprising unmodified starch, pulp fiber powder having a fiber length of more than 50 to 200 $\mu$ m, solvent, photo catalyst (Fe(III) doped titanium dioxide or titanium dioxide which an anatase content is 70% or more) and preservatives (potassium sorbate or sodium benzoate) in the ratio recited in the claims (see Tables 10 and 11 of the present specification).

(1) Bastioli et al.(US 5512378) and Kuroda et al.(US 5786406) do not disclose 100-300  $\mu$ m of a water-resistant film, made of one or more selected from a group consisting of polybutylene succinate, polyethylene succinate, ester starch and cellulose acetate. While Bastioli discloses film having a thickness of 0.6 microns (see Examples 1 and 3 of Bastioli), Bastioli does

not disclose the film having a thickness of 100-300  $\mu\text{m}$ , which has no water permeability to the biodegradable starch bowl. Similarly, Kuroda does not disclose film made of one or more selected from a group consisting of polybutylene succinate, polyethylene succinate, ester starch and cellulose acetate. Based on these deficiencies, Applicants respectfully request that the rejection based on Bastioli and Kuroda be withdrawn.

(2) Biodegradable starch bowls according to embodiments of the present invention are prepared from a composition comprising 0.5-2.0 wt% of titanium dioxide wherein anatase content is 70% or more or 0.5-2.0 wt% of Fe(III) doped titanium dioxide. The presently claimed biodegradable starch bowl composition comprising 0.5-2.0 wt% of titanium dioxide wherein anatase content is 70% or more or Fe (III) doped titanium dioxide, and the biodegradable starch bowl produced therefrom, have a significantly improved sterilizing property (100%) and deodorizing property (100% of a decomposition efficiency of the acetaldehyde), as described in Examples 2 to 4 and Examples 6 to 8 of Table 10 of the present specification, shown below.

【 Table 10】 at page 20 of the specification

Example	Molding property	Compressive strength	Stench	Color change	Sterilizing effect (removal rate of Escherichia coli)	Deodorizing effect (decomposition rate of acetaldehyde)	Preservative property	Releasing property (number)
1	◎	◎	N	N	65%	70%	◎	0
2	◎	◎	N	N	100%	100%	◎	0
3	◎	◎	N	N	100%	100%	◎	0
4	◎	◎	N	N	100%	100%	◎	0
5	◎	◎	N	N	75%	85%	◎	0
6	◎	◎	N	N	100%	100%	◎	0
7	◎	◎	N	N	100%	100%	◎	0
8	◎	◎	N	N	100%	100%	◎	0

Further, the present biodegradable starch bowl composition or the biodegradable starch bowl comprising 0.5-2.0 wt% of titanium dioxide wherein anatase content is 70% or more or Fe (III) doped titanium dioxide displays not only improved sterilizing and deodorizing properties, but also improved molding property and the strength of the bowl, which are both unexpected results, as further discussed in the Declaration under 37 C.F.R. § 1.132 concurrently filed under a separate cover.

In the Action, the Examiner asserts that Sanbayashi et al.(US 2002/0160910) discloses 0.00999-64 mass% of titanium dioxide as presently recited in claims 13, 32, 34 and 36. According to the Office, (see page 5, Paragraph 16), the Examiner reasons that Sanbayashi teaches titanium in the amount of 0.1-20 mass% (see Paragraph [0050] of Sanbayashi), and

discloses that an organic polymer composition contains the photo-functional powder in an amount of about 0.01 to about 80 mass % on the basis of the entire mass of the composition (see Paragraph [0035] of Sanbayashi). The Examiner further contends that the photo-functional powder contains condensed phosphate ions, titanium dioxide and the alkaline earth metal (e.g., Be, Mg, Ca, Sr, Ba, or Ra), which serve as a binder between the condensed phosphate ions and the titanium dioxide, and discloses that the condensed phosphate containing the alkaline earth metal is present in an amount of 0.1-20 mass% (see Paragraph [0050]).

However, when reviewing [0049] of Sanbayashi, the amount of the condensed phosphate present in the titanium dioxide is preferably about 0.01 to about 50 mass %, and more preferably about 0.1 to about 20 mass %, on the basis of the mass of the titanium dioxide. Further, according to [0050] of Sanbayashi, the amount of the alkaline earth metal present in the titanium dioxide is preferably about 0.01 to about 2.0 mass %, and more preferably about 0.01 to about 10 mass %, on the basis of the mass of the titanium dioxide. With regard to Paragraphs [0049] and [0050] of Sanbayashi, Applicants emphasize to the Examiner that the amount of the condensed phosphate and the alkaline earth metal is calculated on the basis of the mass of the titanium dioxide.

Additionally, according to Paragraphs [0049] and [0050] of Sanbayashi, the amount of titanium dioxide may be 100 in a mass, and the amount of the condensed phosphate may be 0.01 to 50 in a mass and the amount of the alkaline earth metal may be 0.01 to 20 in a mass. Thus, the amount of the condensed phosphate and the alkaline earth metal must be based on the mass of the titanium dioxide. Accordingly, it follows that the amount of titanium dioxide is much larger(100) than that of the alkaline earth metal (0.01 to 20) or that of the condensed phosphate

(0.01 to 50). Accordingly, Sanbayashi does not disclose the 0.5- 2,0 wt% of titanium dioxide based on the total amount of the composition as is required by the present claims.

Further, the Examiner asserts that the titanium dioxide of Sanbayashi would be capable of performing intended use, given that Sanbayashi discloses titanium dioxide as claimed. However, Sanbayashi discloses that the composition comprising the anatase-type titanium dioxide does not show desired photo catalytic effects. Further still, Sanbayashi does not disclose the amount of titanium dioxide claimed as described above. Specifically, 98% of the residual ratio of the hydrogen sulfide was detected in the composition of Comparative Example 2 comprising the titanium dioxide in which an anatase content is 70% or more (in this case 100%) (referring to Paragraph [0100] of Sanbayashi), which means that it does not have photo catalytic activity at all, although no hydrogen sulfide was detected in the composition of Example 1 comprising the titanium dioxide containing the brookite-type crystals.

TABLE 1 of Sanbayashi

	Particle size of titanium dioxide (um)	Condensed phosphoric acid	Alkaline earth metal	Use form	Residual ratio of hydrogen sulfide	Weather resistance test	Transmittance at 360 nm	Transmittance
Ex. 1	0.015	Metaphosphoric acid	Ca	Coating of nonwoven fabric	0%	No coloring	--	--
Ex. 2	0.2	Metaphosphoric acid	Cn	Coating of film	98%	No coloring	2%	3%

From the foregoing disclosure, the anatase type of titanium dioxide disclosed in Sanbayashi is not capable of performing the photo catalytic activity. This is because Sanbayashi does not recognize the critical amount of the anatase type of titanium dioxide required for the composition.

Sanbayashi does not teach the amount of titanium dioxide claimed as described above, nor does Sanbayashi teach that the amount of titanium dioxide is a *result-effective variable* which provides photo catalytic activity required for the biodegradable starch bowl. Therefore, Applicants respectfully request that the rejection based on Sanbayashi be withdrawn.

Further, the Examiner has stated that as Sanbayashi teaches that the titanium may be doped with metals and Cassar et al. (US 6,117,229) teaches that it is known to dope titanium with metals. However, neither Sanbayashi nor Cassar disclose an Fe (III) doped titanium dioxide having an amount of 0.5-2.0 wt% based on the total composition, as is required by the present claims. In addition, Applicants demonstrate unexpected results from the composition by comprising Fe (III) doped titanium dioxide in an amount of 0.5-2.0 wt%. The composition comprising Fe (III) doped titanium dioxide in an amount of 0.5-2.0 wt% shows the improved molding property and compressive strength of the bowl, as well as a sterilizing and deodorizing effect. These unexpected results in molding property and compressive strength of the bowl from the composition by comprising Fe(III) doped titanium dioxide in an amount of 0.5-2.0 wt% are represented in Declaration under 37 C.F.R. § 1.132 enclosed herewith.

(3)     Unexpected Results

The biodegradable starch composition or biodegradable starch bowl as defined in currently presented claims comprises potassium sorbate of more than 0.1 to less than 0.5 wt% or sodium benzoate of more than 0.2 or equal to less than 0.5 wt%. As described in Declaration

under 37 C.F.R. § 1.132, Applicants identified that the stench and the color change can be prevented by comprising potassium sorbate of more than 0.1 to less than 0.5 wt% or sodium benzoate of more than 0.2 or equal to less than 0.5 wt% in the composition. The stench, which refers to a nasty smell from the bowl aside from the peculiar smell of the starch, and the color change, which refers to the color of the bowl, is dark brown when compared to that of a standard composition, are both separate properties from the preservative property (referring to [0052] and [0053] of the present specification), and both are unexpected effects from the prior art.

Specifically, when the composition comprises potassium sorbate of more than 0.5 wt% or equal, the stench and the color change occur, even if the preservative property is sufficient for the biodegradable starch bowl. In addition, when the composition comprises less than 0.2 wt% sodium benzoate, the preservative property is not good, and when the composition comprises sodium benzoate of more than 0.5 wt% or equal, the stench and the color change occur, even if the preservative property is improved.

Accordingly, the present invention distinctly features a composition comprising the present amount of the preservative can exhibit stench prevention and color change while maintaining its preservative property.

In this regard, the Examiner states that Sullivan (US 5,382,440) discloses preservatives such as sodium benzoate. However, the critical amounts of preservatives selected by considering the prevention of the stench and the color change as well as the preservative property are not disclosed or appreciated by Sullivan.

While the prior art discloses preservatives such as potassium sorbate, the prior art does not disclose that the preservative can be combined with the photo catalysts in the composition,

nor does the art disclose the unexpected effects regarding the stench and deodorizing effect that can be exhibited by combining the photo catalysts and in a stated weight ratio.

As demonstrated in the Declaration under 37 C.F.R. § 1.132, nasty stench is only prevented when the composition and the bowl of the present invention comprise the preservative as claimed, even if titanium dioxide of 0.5- 2.0 wt% for 100% deodorizing is included. As the combination of the photo catalyst and the preservative affects the property regarding the smell of the biodegradable starch bowl, the bowl can have advantages regarding the prevention of the stench and deodorizing in case where the composition comprises both the photo catalyst and the preservative in a stated ratio. Therefore, the patentability of the currently claimed subject matter cannot be denied by the prior arts which do not disclose the combination of the photo catalyst and the preservative and the unexpected effects derived from the combination.

For the reasons discussed above, it is believed that the rejections are not sustainable and Applicants respectfully request the rejections be withdrawn.

### **CONCLUSION**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number **202-775-7588**.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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